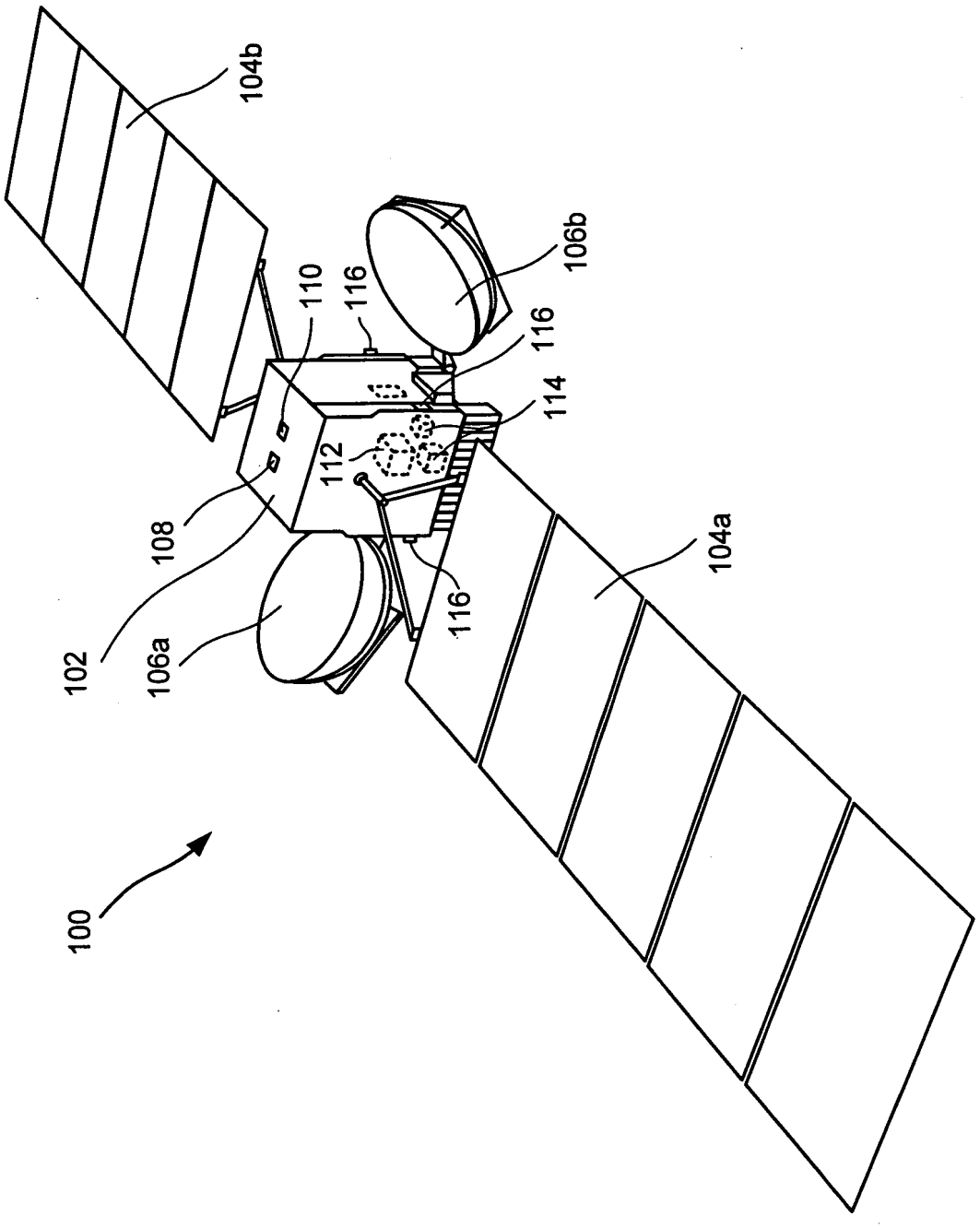

FIG. 1

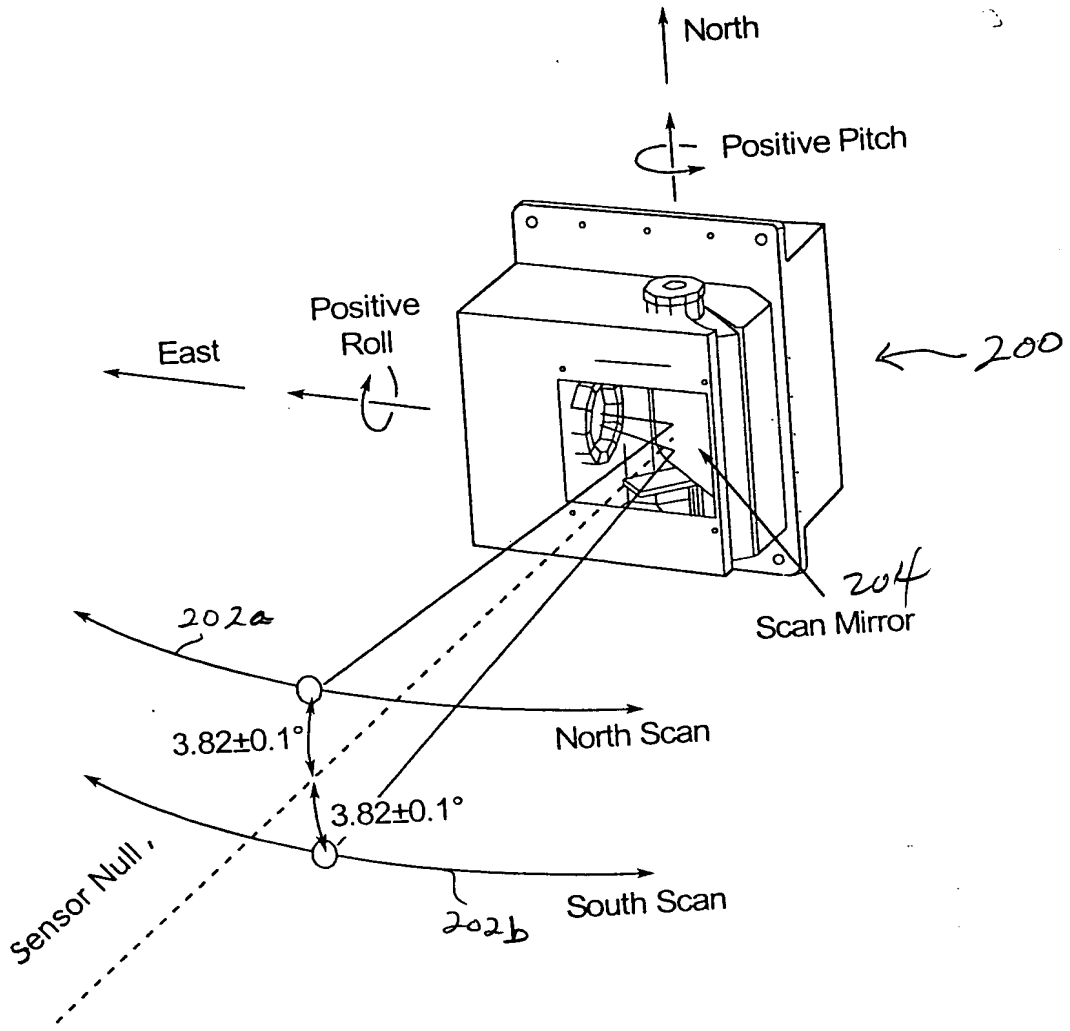
North
Positive Pitch
Positive
Roll
East
200
204
Scan Mirror
202a
North Scan
3.82±0.1°
3.82±0.1°
Sensor Null
South Scan
202b

Fig. 2

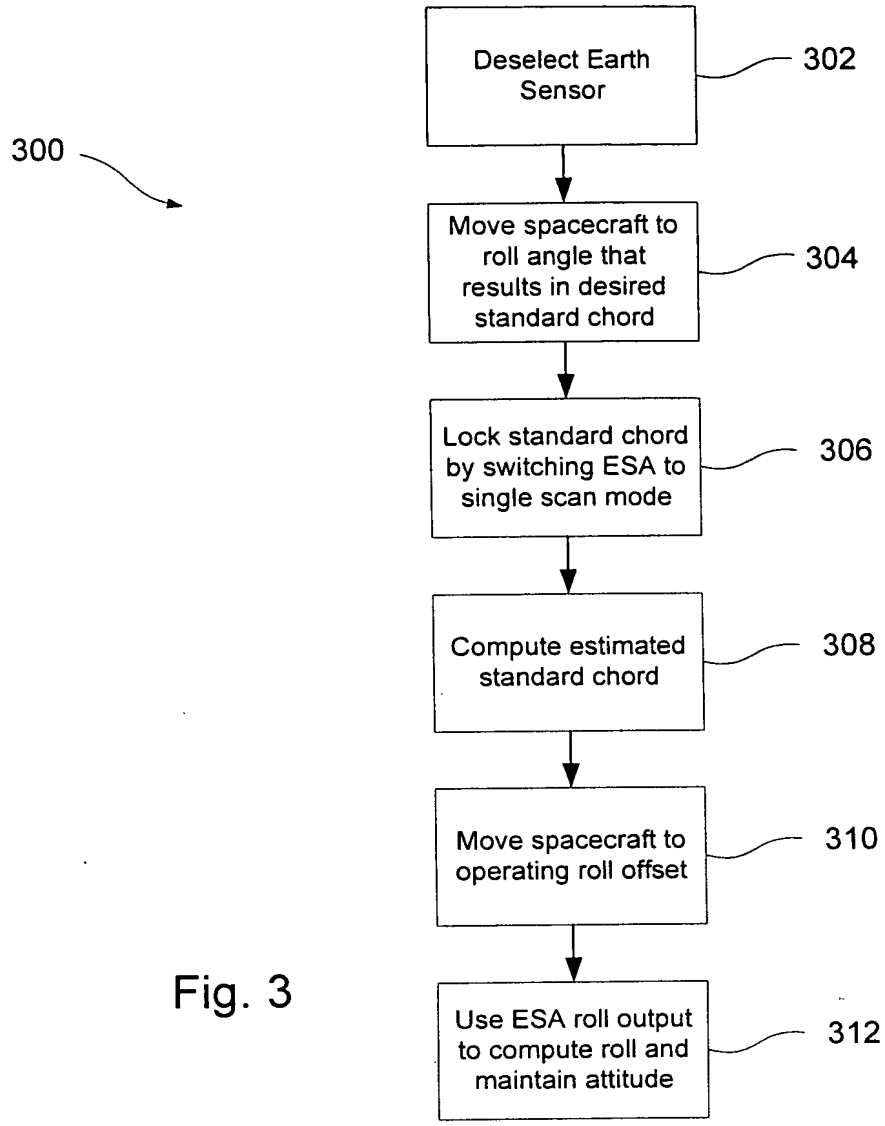
300
Deselect Earth Sensor
302
Move spacecraft to roll angle that results in desired standard chord
304
Lock standard chord by switching ESA to single scan mode
306
Compute estimated standard chord
308
Move spacecraft to operating roll offset
310
Use ESA roll output to compute roll and maintain attitude
312

Fig. 3

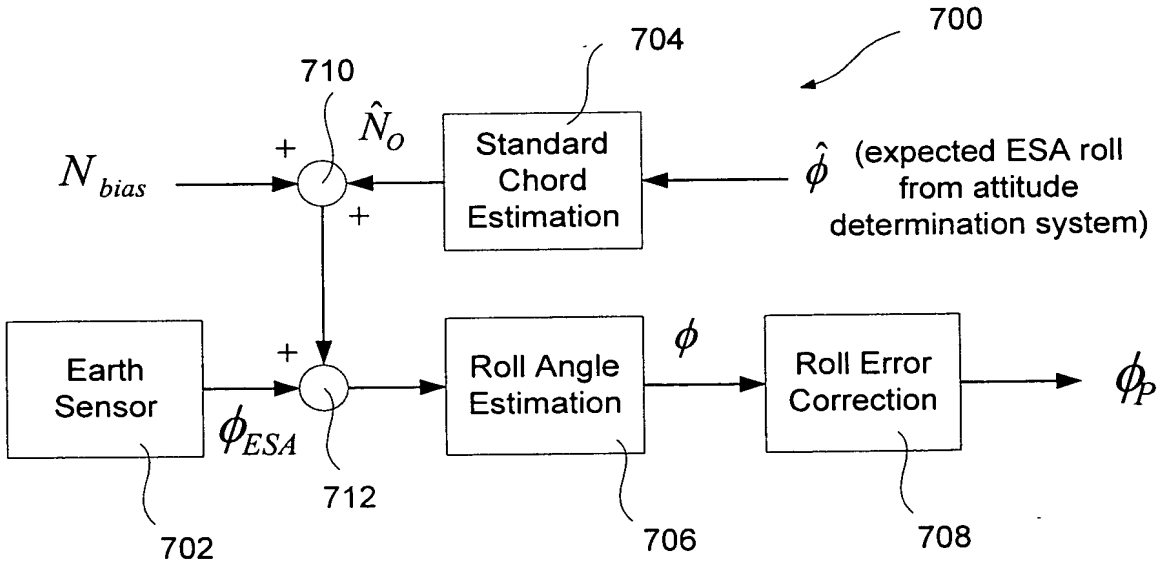
700
704
710
$\hat{N}_O$
N_{bias}
+
+
Standard Chord Estimation
$\hat{\phi}$
(expected ESA roll from attitude determination system)
Earth Sensor
+
ϕ_{ESA}
712
Roll Angle Estimation
ϕ
Roll Error Correction
ϕ_P
702
706
708

Fig. 7

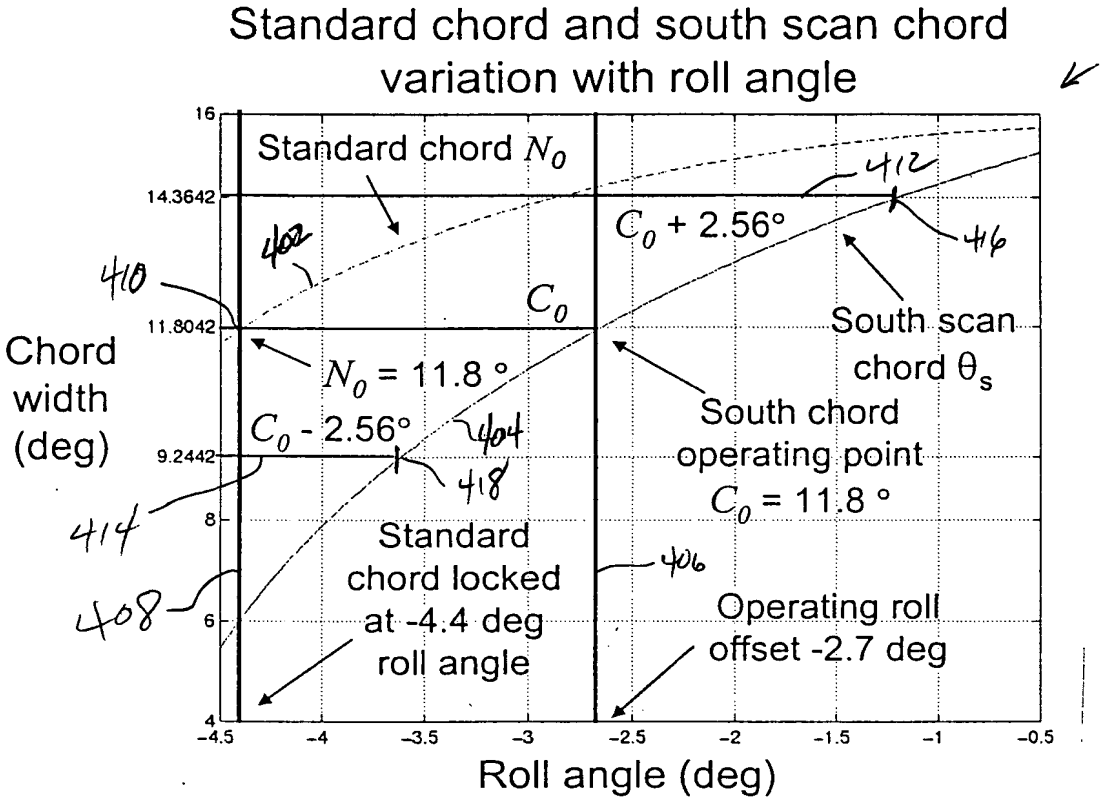
Standard chord and south scan chord variation with roll angle
400
Standard chord N_0
C_0 + 2.56°
C_0
N_0 = 11.8 °
C_0 - 2.56°
Standard chord locked at -4.4 deg roll angle
Operating roll offset -2.7 deg
South scan chord θ_s
South chord operating point C_0 = 11.8 °
Chord width (deg)
Roll angle (deg)
16
14.3642
11.8042
9.2442
8
6
4
-4.5
-4
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
402
404
406
408
410
412
414
416
418

Fig. 4

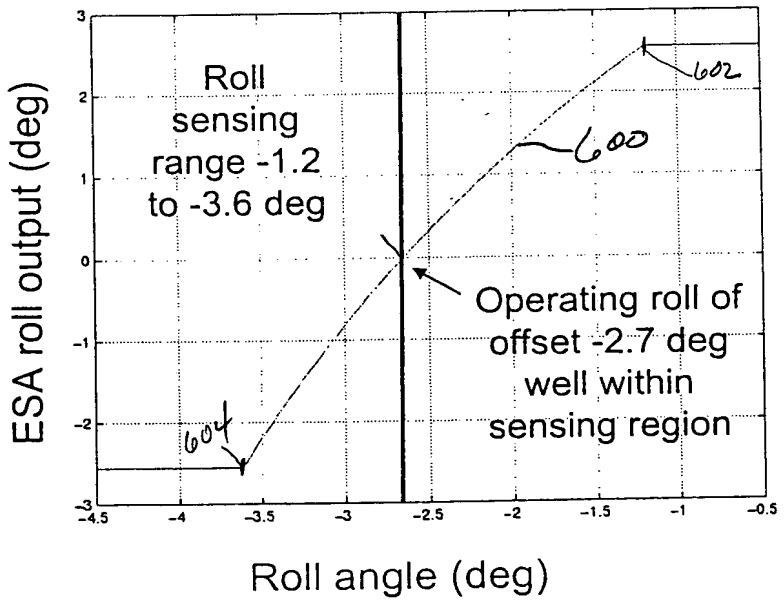
ESA roll transfer function for SICLOPS single-scan mode
Roll sensing range -1.2 to -3.6 deg
Operating roll of offset -2.7 deg well within sensing region
ESA roll output (deg)
Roll angle (deg)
3
2
1
0
-1
-2
-3
-4.5
-4
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
600
602
604

Fig. 6

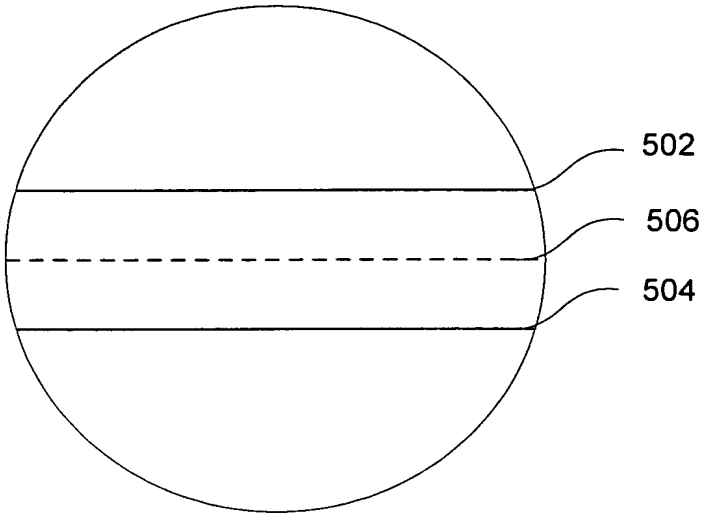

Fig. 5a

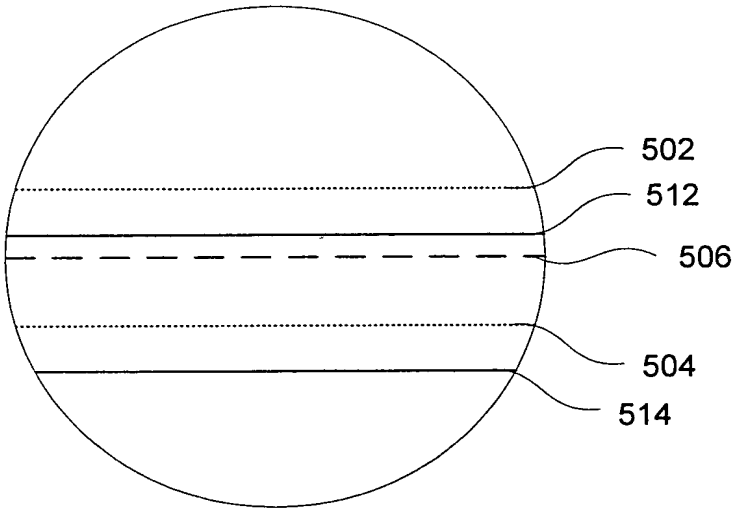

Fig. 5b